

AUTOPOIESIS: WHEN THE QUEEN IS MISSING

"An autopoietic machine is a machine organized (defined as a unity) as a network of processes of production (transformation and destruction) of components which: (i) through their interactions and transformations continuously regenerate and realize the network of processes (relations) that produced them; and (ii) constitute it (the machine) as a concrete unity in space in which they (the components) exist by specifying the topological domain of its realization as such a network."

The Tree of Knowledge: The Biological Roots of Human Understanding
- Humberto Maturana and Francisco Varela -

Diacamma rugosum is a species, native from South East Asia, that belongs to the ponerinae subfamily. Ponerines are solitary hunters who form small colonies and apply a basic division of labor in the organization of the colony. In contrast to the advanced caste system of the leafcutter ants, Ponerines are innate hunters, they like to predate on insects, capture and sting them, not kill them on the act just narcotize them, so that their sisters back in the nest can eat them alive. Ponerines are professional killers that altruistically share their booty with the rest of the colony. Ponerines are interesting because this subfamily still possesses primitive characteristics of their ancestors, which combined with a wide selection of social adaptation patterns make them the perfect target species to study the evolution of sociogenesis in ants. The genera, and most of its pertaining species like *Diacamma rugosum*, still retain the primitive faculties as solitary hunters and social workers.

But the most interesting behavior in the Ponerines is by far its unusual and unique reproduction strategy. Normally a queen is considered to be a different caste within the colony structure of ants, that's how reproduction focuses only on one individual and the rest is division of labor based on specialized castes that take care of getting the energy and working the resources for the colony. The queens of *Diacamma rugosum* are not a specialized caste with morphological characteristics that distinguish them from the rest of the workers. *Diacamma rugosum* queens are gamergates, which means reproductive workers with the same morphological features like any other worker in the colony (I will refer hereon to the gamergate of the colony as the queen). To make the story short, any new born worker in a colony of *Diacamma rugosum* could be a queen.

On the case of *Diacamma rugosum*, future queens are chosen by the actual queen of the colony, therefore the inevitable key figure for the development of the colony is she. When new females are born, the queen extracts, like a sterilization procedure, the reproductive gems of several females leaving only a few, or even just one, to be able to develop sexually as new queens with the desire for reproduction. The ones who lose the gems become workers. The organs responsible for the desire to mate and reproduce are called gems because when seen up close with the microscope, they do look like gems. It should have nothing to do with royalty, although the name suits perfectly the "royal status" inherited by the new queen from her mother. The whole process is controversial. Every new born ant can potentially become a queen with the capacity to reproduce, so the queen plays an important role by electing who would be her heiress in order to minimize the conflict and the dispute for the throne. The queen extracts the organs, responsible for reproduction behavior of the potential virgins, in order to influence the division of labor in the colony. Thus, the queen becomes really, and literally as her name states, a hierarchical director for the development of the future system.

It seems that nepotism has found its way into the dynamics of yet another society. Here we have an out of the ordinary ant colony which does have, if we play along with our human imagination, a monarchy. The central administrative figure is the queen and she decides which of her daughters is a peasant and who deserves to be crowned as a future queen. The state has a leader that takes care of the principal organization, while its workers struggle and pay taxes for the wealth of the system by becoming hunters and builders, risking their lives to the perils of the cruel savage world, instead of relaxing securely on the royal chamber being fed and groomed all day long. Hereto, ants function pretty much like a human state. If there is a central figure that has the power to decide its legacy, then self-organization is questioned because the participation in the creation of a state shrinks from a total form of altruism (open source contribution) to a controlled form of altruism (honorary distribution).

But what happens when the workers revolt against her nepotistic mother? A coupe d'état. What happens when the queen is missing? Transformation and destruction. The unity has to auto-regulate in order to survive as a network in the recently established new order. Chaos precedes order. The symbiotic connection and interdependence with its external environment was suddenly destroyed, its nepotistic leader removed and the external influences cut off. The *Diacamma rugosum* colony became self-contained.